Use of Traffic Monitoring Data To Estimate LOS Defaults

0011 0010 1010 1101 0001 0100 1011

Dena Jackson, EI

Terrel Shaw, PE

Doug McLeod

PBS&J
PBS&J

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

1 2
4 5

Outline

- Purpose/Methodology
- Classification of Sites
- K, D, and T Estimators
- Conclusions

Purpose/Methodology

0011 0010 1010 1101 0001 0100 1011

Purpose

- Use Data From FDOT's Telemetered Traffic Monitoring Sites (TTMS) To Support LOS Analysis Planning Needs
- Analyze And Compare Planning Analysis Hours And Factors
  - K – ratio of peak hour to AADT
  - D – directional distribution factor
 - T – percent of heavy vehicles

Methodology

- Aggregate Traffic Data Collected At Each Site for Three-Year Period Where 150 or More Days of Data Available

- Classify FDOT's TTMS According To LOS Needs

- Compare Peak Hours
  - 30HV – 30th Highest Hourly Volume
  - 100HV – 100th Highest Hourly Volume
  - Peak/Daily – Highest Hour of Day
  - 18th Hour of Day – 5:00 to 6:00 Weekday Peak Hour

TTMS

Collect Data

- 24/7/365
- 15 Minutes Interval
- Speed
- Volume
- Classification
- Freeways and Arterials

LEGEND

⊕ TTMS Locations

⋀ Florida Intrastate Highway System

SUNGUIDE

Source: FDOT

PBSJ
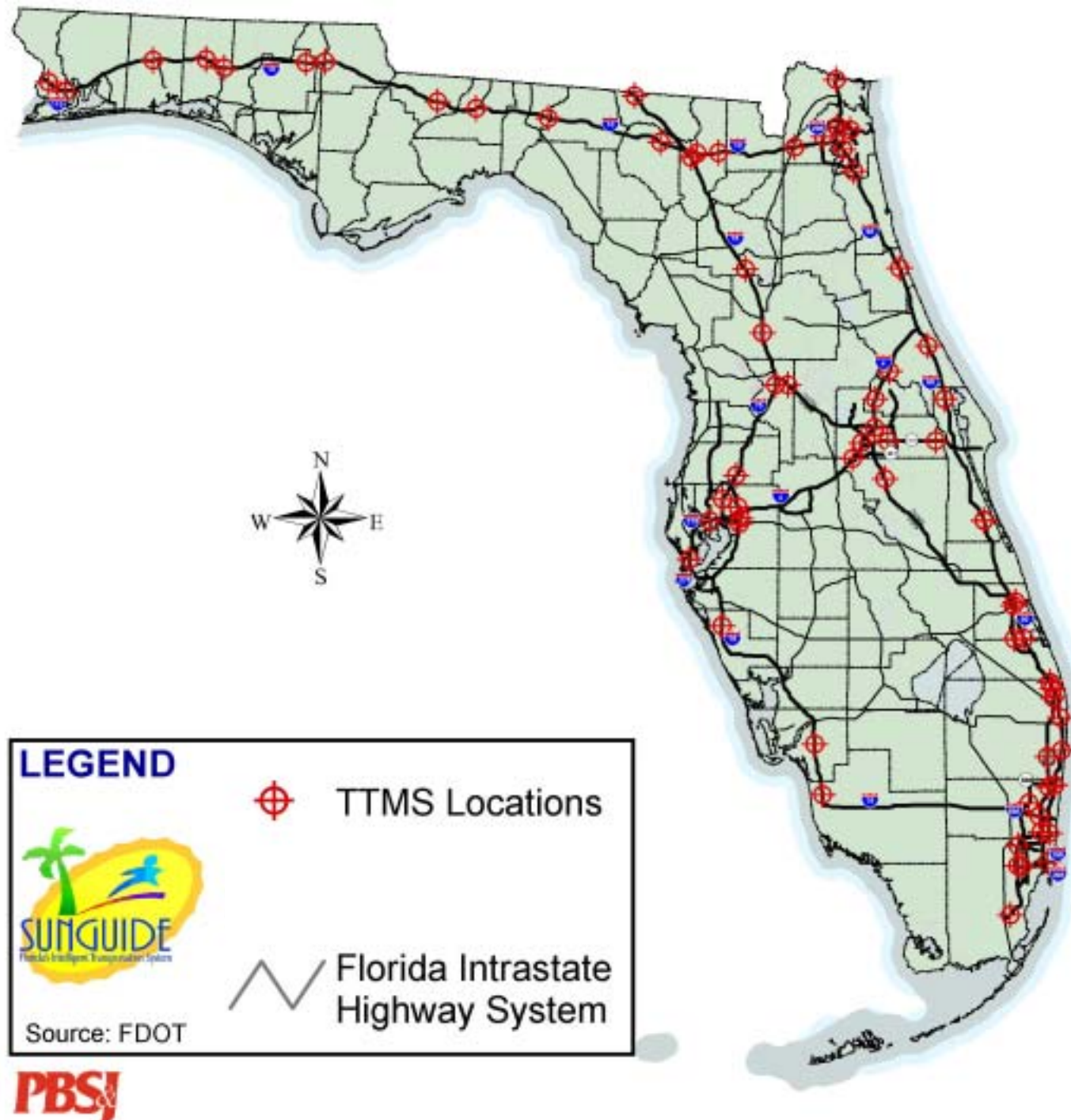
Classification of Sites

0011 0010 1010 1101 0001 0100 1011

Classification of Sites

- Related Milepost of Each Site To Classification in Roadway Characteristics Inventory

- Developed A Cross-Classification Scheme To Relate RCI and LOS Types
  – Initial LOS Classifications Numerous

LOS Classification (Initial)

Area Types

1. Located in Counties With Greater Than 500,000 in Population (Seven)
2. Urbanized Areas Outside Seven-Largest
3. Located in Downtown Area
4. Other Corridors Outside Urbanized Area With Significant Commuting Characteristics
5. Transitioning Areas – In Metropolitan Area But Not Yet Urbanized
6. Urban Places or Communities
7. Rural Areas

LOS Classification (Initial)

Functional Class

1. Freeways
2. Multilane Highway
3. Two-Lane Uninterrupted Highway
4. Principle Arterial

   $\geq$ 4.5 Signals Per Mile

   < 4.5 Signals Per Mile

5. Minor Arterial

   $\geq$ 4.5 Signals Per Mile

   < 4.5 Signals Per Mile

Capacity Constrained Facility

   If K100 Less Than 8 Percent

Median

Summary of Initial LOS Classes

Facility Type	Area Type	Downtown	Signalized Intersections Per Mile	Principle or Minor Functional Class	Capacity Constrained	Median
Freeways	$U_{>500k}$	●			●	
	$U_{<500k}$				●	
	U_C				●	
	T				●	
	u				●	
	C				●	
	R				●	
Arterials	$U_{>500k}$		●	●	●	●
	$U_{<500k}$		●	●	●	●
	U_C		●	●	●	●
	T		●	●	●	●
	u			●	●	●
	C				●	●
	R				●	●
Multilane Highway	C				●	●
	R				●	●
Two-Lane Highway	C				●	●
	R				●	●

57 Possible Classifications

LOS Classification (Final)

- For The Purposes of K, D and T Factors Were Able To Simplify Classification Due To Few Statistically Significant Differences To
  - Urbanized Freeway
  - Urban/Transitioning Freeway
  - Rural Freeway
  - Rural Multilane
  - Two-Lane Uninterrupted Facility
  - Arterial
- K-Factors Need For Constrained and Unconstrained Facilities
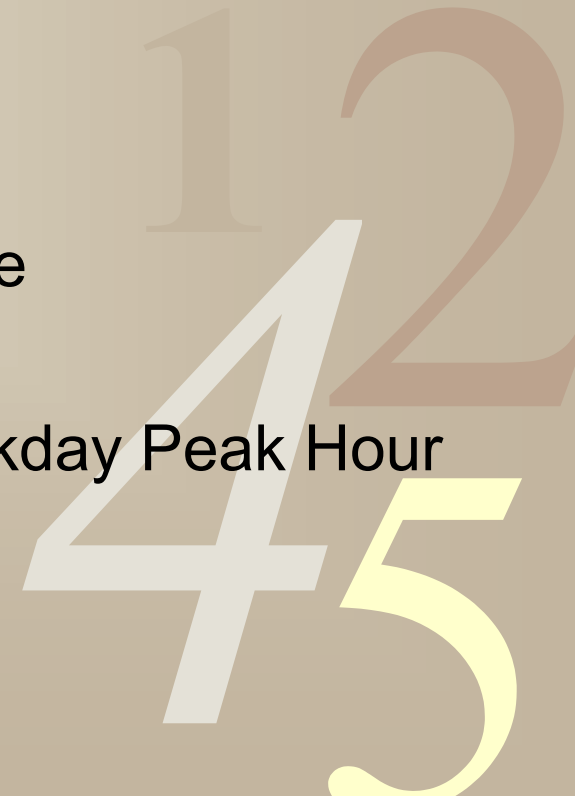
Estimation of K, D, and T

0011 0010 1010 1101 0001 0100 1011

Questions

- ## What Estimator
  - Mean, Median or Mode

- ## What Period
  - 30HV – 30th Highest Hourly Volume
  - 100HV – 100th Highest Hourly Volume
  - Peak/Daily – Highest Hour of Day
  - 18th Hour of Day – 5:00 to 6:00 Weekday Peak Hour

Estimator

- Decided on Median
  - 50% Greater And 50% Less
  - Average Influenced By Extreme Values
- Considered Medians of All Data vs. Median by Groups
  - Results Statistically Equivalent But Chose Median by Groups (Day at Each Site)
- Provided Acceptable Ranges As Well As Point Estimators

Sample Sizes

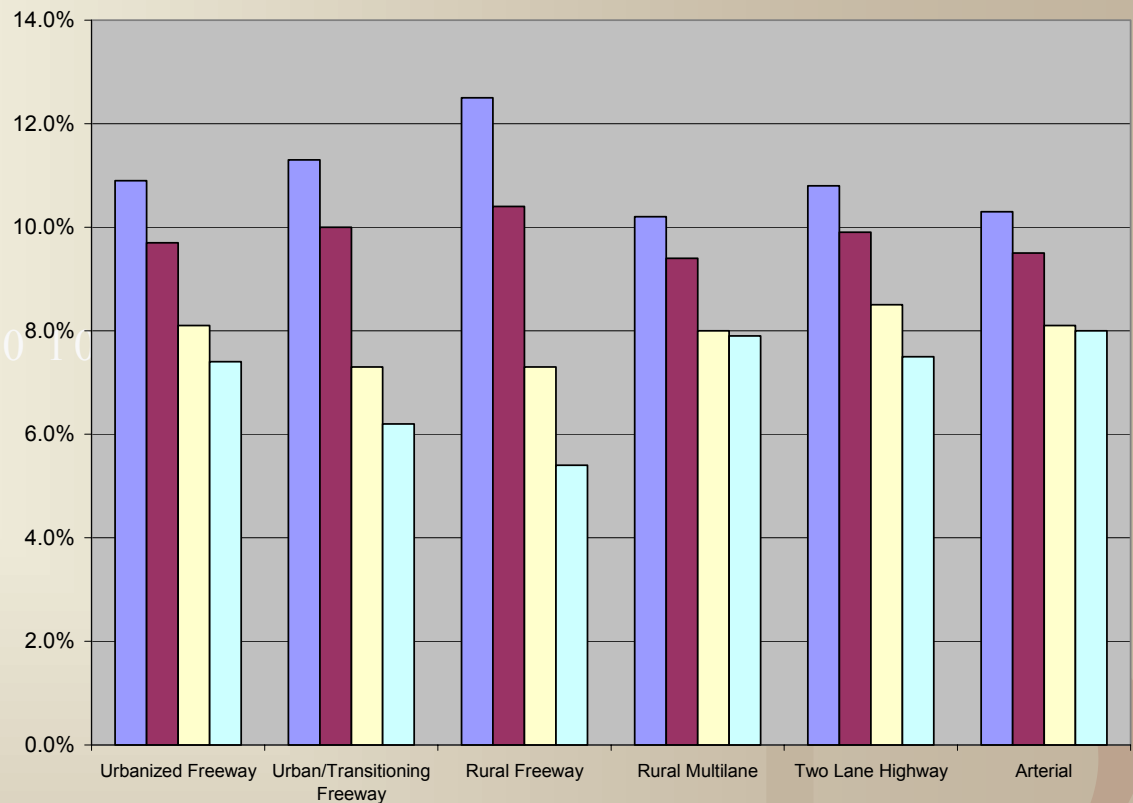| Sample Sizes	Days	Groups	Sites
Urbanized Freeway	6,082	53	11
Urban/Transitioning Freeway	6,130	25	18
Rural Freeway	4,729	22	22
Rural Multilane	6,302	32	11
Two Lane Highway	30,584	156	54
Arterial	14,397	203	63
Total	68,224	491	179

Days = Complete 24 Hour Sample

Groups = Annual Set of Data With 150 Or More Days
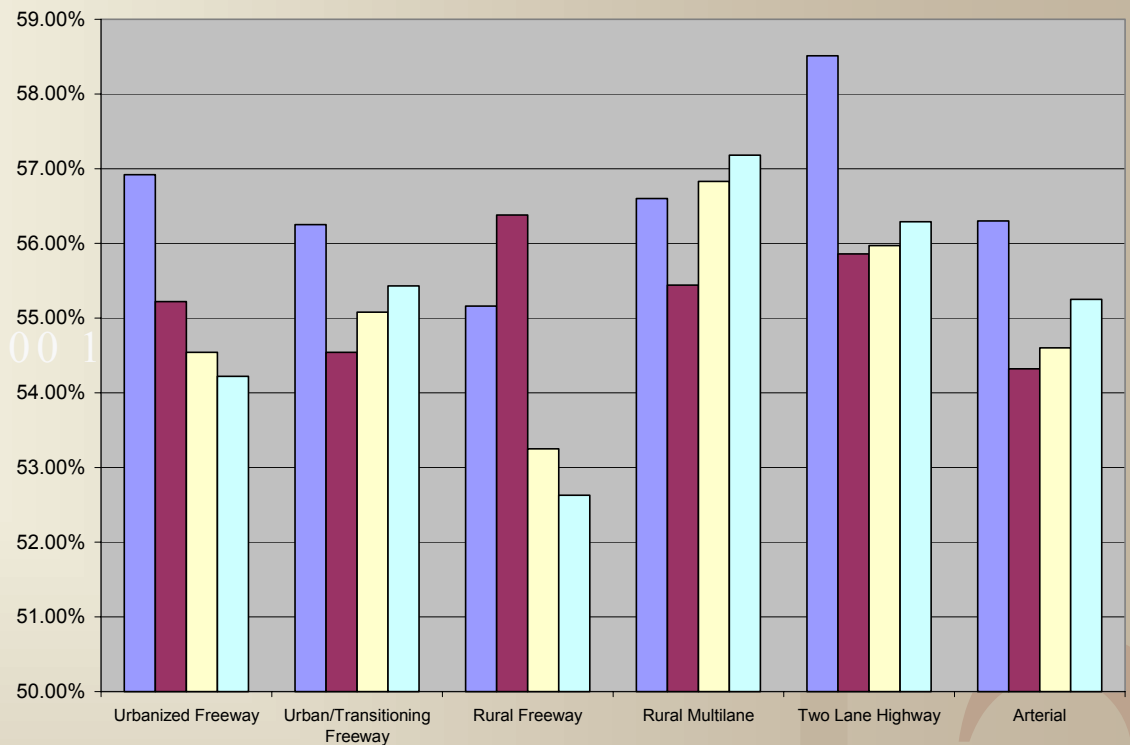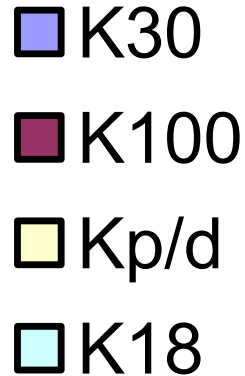
Sites = No. Of TTMS Sites

K-Factors

LOS FT/K-Factors	K30	K100	Kp/d	K18
Urbanized Freeway	10.9%	9.7%	8.1%	7.4%
Urban/Transitioning Freeway	11.3%	10.0%	7.3%	6.2%
Rural Freeway	12.5%	10.4%	7.3%	5.4%
Rural Multilane	10.2%	9.4%	8.0%	7.9%
Two Lane Highway	10.8%	9.9%	8.5%	7.5%
Arterial	10.3%	9.5%	8.1%	8.0%

D-Factors

LOS FT/D-Factors	K30	K100	Kp/d	K18
Urbanized Freeway	56.92%	55.22%	54.54%	54.22%
Urban/Transitioning Freeway	56.25%	54.54%	55.08%	55.43%
Rural Freeway	55.16%	56.38%	53.25%	52.63%
Rural Multilane	56.60%	55.44%	56.83%	57.18%
Two Lane Highway	58.51%	55.86%	55.97%	56.29%
Arterial	56.30%	54.32%	54.60%	55.25%

T-Factors
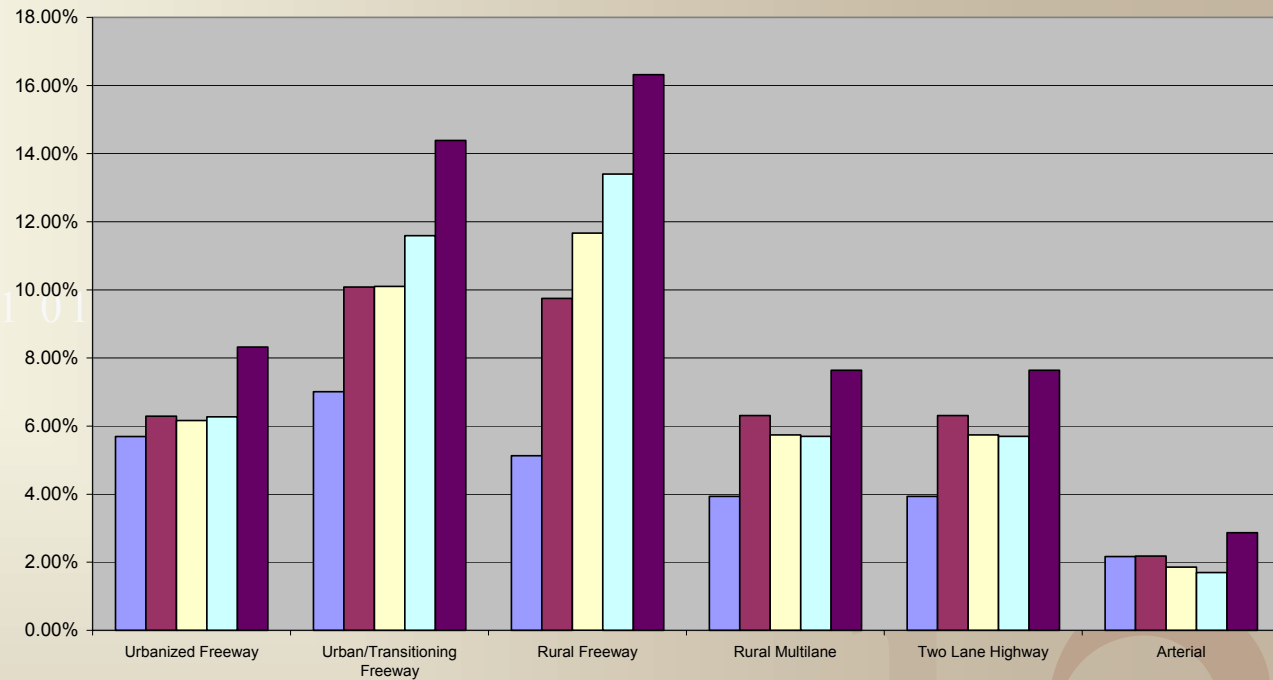
LOS FT/T-Factors	K30	K100	Kp/d	K18	Daily
Urbanized Freeway	5.69%	6.29%	6.16%	6.27%	8.32%
Urban/Transitioning Freeway	7.01%	10.08%	10.10%	11.59%	14.39%
Rural Freeway	5.13%	9.75%	11.67%	13.40%	16.32%
Rural Multilane	3.94%	6.31%	5.74%	5.70%	7.64%
Two Lane Highway	3.94%	6.31%	5.74%	5.70%	7.64%
Arterial	2.17%	2.18%	1.86%	1.70%	2.87%

Conclusions

0011 0010 1010 1101 0001 0100 1011

Conclusions

- Traffic Monitoring Data Provide A Robust A Valuable Source of Data To Support Estimation of LOS Defaults

Questions

Dena Jackson, EI

1880 S. Dairy Ashford Street, Suite 300

Houston, Texas 77077

281.493.5100

denajackson@pbsj.com